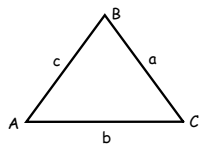


4.4 The Cosine Law

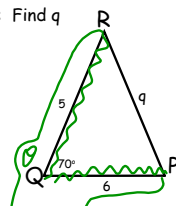
For any acute triangle the Cosine law is true:

To find a side:

$$a^2 = b^2 + c^2 - 2bc \cos A$$



Ex 1: Find q



$$\begin{aligned} q^2 &= p^2 + r^2 - 2pr \cos Q \\ q^2 &= 5^2 + 6^2 - 2(5)(6) \cos 70^\circ \\ q^2 &= 40.4 \dots \dots \\ q &= \sqrt{40.4} \dots \dots \\ q &\approx 6.4 \end{aligned}$$

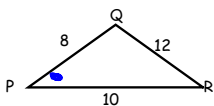
What if you need to find an angle?

$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos A \\ 2bc \cos A &= b^2 + c^2 - a^2 \\ \cos A &= \frac{b^2 + c^2 - a^2}{2bc} \\ A &= \cos^{-1} \left[\frac{b^2 + c^2 - a^2}{2bc} \right] \end{aligned}$$

Then to find an angle use:

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Match side and angle

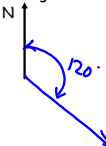
Ex 2: Find $\angle P$ 

$$\begin{aligned} \cos P &= \frac{8^2 + 10^2 - 12^2}{2(8)(10)} \\ \cos P &= \frac{1}{8} \\ P &= \cos^{-1} \left(\frac{1}{8} \right) \\ P &\approx 83^\circ \end{aligned}$$

Get your bearings.....

The bearing angle:

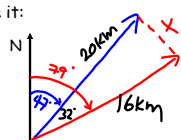
- is the angle between the magnetic North and the direction of travel, clockwise direction.

a) bearing of 56° b) bearing of 120° c) bearing of 320° 

Ex 3:

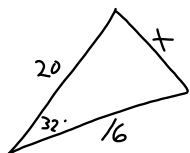
Two boats left the Hamilton Harbour at the same time. One traveled with the speed of 10 km/h on a bearing of 47° , another traveled at 8 km/h on a bearing of 79° . How far apart are the boats after 2 hours?

Picture it:



Hamilton

\therefore the two boats are 10.6 km apart.



$$X^2 = 20^2 + 16^2 - 2(16)(20)\cos 32^\circ$$

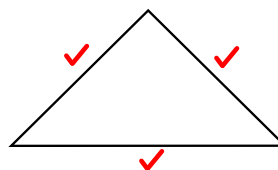
$$\sqrt{X^2} = \sqrt{113.24} \dots \dots$$

$$X = 10.6$$

We use the Cosine Law to solve an oblique triangle when we are given:



-two sides and the contained angle



- three sides of a triangle

Hmwk

p 299 # 2, 3, 5ad, 7, 9

